Innovations in Rural and Agriculture Finance

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New Approaches for Index Insurance: ENSO Insurance in Peru

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The El Niño Southern Oscillation (ENSO) is a climate event associated with warming sea surface temperatures in the Pacific Ocean. In years of extreme El Niño events, areas in northern Peru experience catastrophic flooding. As of 2010, it is possible for stakeholders in northern Peru to purchase a new form of insurance that pays out just as flooding begins and stakeholders begin incurring extra costs and consequential losses. Given the high basis risk associated with selling index insurance to households, this insurance is designed for firms and institutions that serve households that are highly exposed to El Niño. ENSO insurance is sold by a Peruvian insurance company, and a major global reinsurer carries most of the risk. This new insurance product is the first insurance to use sea surface temperature as the proxy for catastrophic losses and also the first regulated "forecast index insurance" product in the world. This innovation could enhance progress in developing index-based insurance products for extreme weather events.

Recent years have seen a growing number of pilot tests of index insurance for weather risk, motivated by an increased understanding of how natural disasters affect developing countries. Beyond immediate suffering (including deaths, destroyed assets, and lost income), disasters have troublesome indirect effects: economic growth can be disrupted, the poor are thrust into permanent poverty traps, and the mere presence of these risks constrains access to financial services and causes many decisionmakers to pursue low-return, low-risk strategies that impede economic progress.

Much of the development of index insurance focuses on agriculture, because activities associated with agriculture remain the primary livelihood strategies for the rural poor in developing countries. Thus far, most index insurance pilots have involved products targeted at households—that is, micro-level products. Index insurance uses an objective measure (an index) of a natural event known to cause losses (such as excess rain, high river levels, or extreme sea surface temperatures). Using an index as the proxy for loss dispenses with expensive loss assessments. Furthermore, use of an index diminishes moral hazard and adverse selection, problems that plague traditional forms of insurance. Given these advantages, index insurance may be well suited to developing countries where data are sparse and delivery of financial services to smallholder households increases the per-unit cost of traditional insurance.

Despite the promise of index insurance, uptake by smallholder households is slow. Presently, index insurance may be better suited for risk aggregators—that is, groups or institutions that aggregate the risk of households either through the services they provide or through informal risk-sharing arrangements (for example, agricultural lenders, firms in the value chain, and farmer associations). Focusing first on risk aggregators should also help build linkages and sustainable products that will directly serve smallholder households.

Index insurance and correlated losses

As a precondition of index insurance, losses created by the natural disaster to be insured must be strongly correlated—that is, a large number of individuals must suffer losses at the same time. Given that many individuals suffer a loss at the same time, risk aggregators will also suffer serious losses. Thus, correlated losses from natural disasters constrain the development of credit markets for the rural poor, particularly for those involved in agriculture. Lenders cannot absorb the risk exposure of a large number of borrowers who may be unable to pay off loans after a major natural disaster.

Likewise, an insurer deciding to write any form of insurance against extreme weather events must have a means to transfer these risks—generally through a global reinsurer. Insurers in developing countries often find obtaining access to reinsurance markets difficult. If the index being used is fully transparent, the global reinsurer is more likely to feel comfortable with the systems used to estimate the index. This is certainly the case for ENSO measurements, which have been developed over more than 50 years by the U.S. National Oceanic and Atmospheric Administration (NOAA).

Extreme weather events such as drought and flooding can also have associated consequential losses that extend beyond traditional crop insurance, which pays for losses of a specific crop. For example, in a number of African countries, where owning livestock is a form of savings, extreme droughts compel large numbers of farmers to sell their livestock at the same time. Distressed sales of livestock on local markets depress local prices, compounding losses. Floods and droughts also generally influence the quality of crops, not just yields. Moreover, risk-management strategies to diversify cropping enterprises can quickly prove ineffective if droughts or floods negatively affect all of the crops at the same time.

ENSO insurance as a form of business-interruption insurance

In Peru, where ENSO insurance is being tested, the consequential losses and problems associated with extreme rainfall and catastrophic flooding are enormous—crops are lost, trees die, soils wash away, transportation systems break down, incidence of disease (such as malaria) increases, and markets are destroyed. When individuals and local markets suffer in this fashion, firms in the value chain and the financial sector also suffer.

In the extreme El Niño years 1983 and 1998, the volume of water in the Piura River was about 40 times greater than normal. Although Piura was among the worst-affected areas, a number of other regions in northern Peru were also severely affected. In 1998, with a clear indication that El Niño was coming, farmers simply did not plant crops, resulting in a 27 percent drop in fertilizer sales in northern Peru. Agricultural lending was growing at a significant pace before the 1997–98 El Niño, but that growth came to a halt after the event. Microfinance institutions (MFIs) had a significant increase in problem loans. Because of the 1998 El Niño, the default rate on agricultural loans increased from about 8 percent of all agricultural loans to more than 18 percent for MFIs operating in the region of Piura. Loan default is defined as loans that were 60 days late or more in payments. Once loans fall into this category, the probability of collection is nearly zero. Additionally, member deposits and savings—the major sources of capital for the MFIs— declined

by roughly 15 percent as people withdrew funds to cope with the problems created by the event. It took at least three years to recover from the compounded problems of loan defaults, loan restructuring, and savings and member deposit withdrawals.

ENSO insurance was presented to the Peruvian insurance regulators as a form of business-interruption insurance designed to pay for consequential losses and extra costs linked to extreme flooding, which is highly correlated with ENSO. ENSO insurance fits well in a class of insurance called "contingency insurance." Contingency insurance is intended to protect policyholders against a variety of consequences associated with a specific event; these consequences can include loss of assets, losses in normal business revenues, and increased costs associated with addressing the event. Experience in Peru suggests that formulating index insurance as contingency insurance against a natural disaster has potential applications in many regions of the world highly exposed to severe weather risks such as drought or flood.

The ENSO insurance uses the monthly sea surface temperature for ENSO Region 1.2 (0–10° South, 80–90° West), measured and reported by the NOAA Climate Prediction Center. The basis for payment is the average of two months—November and December. Three contracts are available with three different thresholds where payments begin (23.4, 24.0, and 24.5 degrees Celsius); each of these contracts reaches a maximum when the measure reaches 27 degrees. The payout function is linear. Indemnity payments are made in early January, just as flooding begins, and flooding continues from February to April.

Indemnity payments are made by multiplying the payout rate times the sum insured, which is selected by the insured party. A risk assessment that estimates the largest losses that may occur under the worst flooding event is likely the best starting point for selecting a sum to be insured. Prudent buyers of insurance will be more likely to select a value that is less than these estimates, given the expense of this type of insurance and the fact that they have other risk-management mechanisms that can be blended with the ENSO insurance in an optimal fashion.

Since the ENSO insurance pays before the catastrophe, educational efforts have focused on helping people in the target markets understand how to use the extra cash to mitigate the impending crisis. Farmers' associations in remote regions of Piura have expressed an interest in using the funds to clear drainage systems because heavy rains associated with ENSO increase the likelihood that drainage systems will clog. Lenders are interested in using payments to ease the liquidity crisis and associated cost. Those in the value chain are interested in smoothing their losses and maintaining their specialized workforce when revenues are temporarily low because of El Niño. Finally, ENSO insurance is also being offered to local and regional governments to provide ready cash to mitigate some problems associated with catastrophic flooding.

To begin, the insurance company is offering ENSO insurance only to highly exposed risk aggregators. Demand from other firms and institutions that are exposed to El Niño risk will then drive the expansion of this market. Anecdotal evidence points to substantial interest in ENSO insurance. After some initial press releases on the product, the insurer was inundated with calls from a variety of firms and institutions interested in the product. At this stage, ENSO insurance is not being made available to smallholder households. The product can, however, be tied to other financial services in a fashion that gives smallholders greater access to these services at better prices.

Conclusion

El Niño events affect many regions of the world. The most dramatic effects probably occur in Peru and Ecuador, but El Niño affects other countries in South, Central, and North America as well as in Southeast Asia and East Africa. In some regions, El Niño is associated with flooding, and in others it is associated with drought. Although no other region may have as strong a correlation between sea surface temperature and flooding as northern Peru and southern Ecuador, this project may increase awareness and lead to new thinking and opportunities regarding the potential for forecast index insurance and the relationship between natural disaster risk and oceanic oscillations such as ENSO. ■

For further reading: J. R. Skees, J. Hartell, and A. Murphy, "Using Index-based Risk Transfer Products to Facilitate Micro Lending in Peru and Vietnam," *American Journal of Agricultural Economics* 89 (2007): 1255–61; J. R. Skees, "Challenges for Use of Index-based Weather Insurance in Lower-Income Countries," *Agricultural Finance Review* 68 (Spring 2008): 197–217; J. R. Skees and B. J. Barnett, "Enhancing Micro Finance Using Index-based Risk Transfer Products," *Agricultural Finance Review* 66 (2006): 235–50.

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